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**Core Mathematics, Level 3 Mathematical Studies Guide**

**How Core Mathematics will be taught:**

Students taking Core Mathematics, level 3 Mathematical Studies, must be secure in the GCSE Mathematics syllabus content at foundation tier, evident in at least a grade 4 GCSE Mathematics result. The course will be taught in four lessons per week in one year. The nature of the course is that there is limited new mathematical content from GCSE (although there is some) and the emphasis lies heavily on recognising the role of mathematics in the real world. Students will often have selected the course to support the mathematical elements in their other subjects such as A levels in Biology, Psychology, Geography, Business, Economics, Sociology or BTEC Science. Much of lesson time will focus on recognising real life applications of mathematical skills and shared discussions of how to interpret given data. Students will explore possible strategies in critical analysis of the information we read. The course should enable you to develop your mathematical modelling, evaluating and reasoning skills. Confidence in personal finance and taxation forms an important aspect of the course and students are encouraged to relate this to their own personal experience and future plans.

The qualification includes making use of preliminary materials, shared with students in the Spring term – these include up to date information regarding income tax and national insurance, alongside context based information and data that will be utilised in the exam. Lesson time will be given to exploration and discussions around these materials.

**Working expectations:**

It is essential that students interact in lessons and are prepared to suggest strategies, try out ideas and reflect critically on whether solutions are sensible. The teacher will revisit mathematical techniques previously met at GCSE with the group and some routine practice may be needed, but the emphasis will lie more heavily on applications in problem solving. An important element of the content is on real life estimation and in setting up and justifying appropriate assumptions that allow an estimate to be formed (known as fermi estimation): such problems do not have a singular right answer; they are judged by the critical analysis of the problem that has been applied in reaching your answer. Where new content is taught this is likely to be the statistical content relating to paper 2 (see the specification overview below). The challenges is effective statistical analysis are often in translating between written, graphical and numerical descriptors of information – students are expected to draw on examples found from elsewhere, including the other subjects they study. There will be some use of spreadsheets for data analysis and students are expected to have a calculator for use in all lessons.

**What 100% effort in this subject looks like:**

Resilience is an essential element of success in core maths. Students, who may not have always been very confident in their prior attainment in mathematics, need to persevere with extended problems, listen to and share ideas and strategies with others. Structuring well written accounts of a completed process can be challenging at first but these are skills that develop from experience. Successful students will often arrive to lessons with their own mathematical problems that they have found and will seek out opportunities to discuss personal finance with family and employers as well as teachers. A measure of the success of your learning will be that you more readily question the validity of statistical statements made in the media, drawing on your understanding of reliable data collection, analysis, representation and interpretation.

**Folder Policy:**

*Your folder should have:*

* An up to date index of contents at the front, followed by the AQA Mathematical methods formula book and statistical tables documents.
* Collections of the problems that have been shared in class
* Copies of mathematical problems from your other subjects that have been explored in lessons
* Notes and examples from lessons organised by topic and separating paper 1 and paper 2 content
* Annotated copies of the pre-release materials, including those from previous years used for exam practice
* All teacher marked practice exam questions to be kept in the back of the two sections of your folder

**What Marking looks like:**

* Many of the problems solved will be self-marked. When errors are made these should be clearly identified and corrected.
* Homeworks based on finding information and examples will be visually checked but not graded
* Teacher marking of students’ work is intended to assess: the accuracy and skill with which you manipulate mathematical expressions and use graphs, sketches, tables and diagrams; correct and effective use of mathematical language and symbols in representing situations mathematically; success in devising, implementing and communicating an effective solution strategy for unstructured real-life problems. Grading will pinpoint those aspects of the work that need to be developed to improve the quality of the solution.

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**What Homework looks like:**

* Gathering together mathematical problems from your other subjects, alongside those found in the media, to bring to lessons for further study
* Reading ahead of exemplar data and information sheets
* Paired and individual preparation for presentation of critical analysis of data
* Some gathering of data to inform fermi estimation problems
* Further practice exercises of methods developed in class
* Sample practice exam questions

**Mathematical Studies Specification at a glance:**

|  |  |
| --- | --- |
| Paper 1: Compulsory Content | Paper 2: Option 1 Statistics |
| **Data analysis**Collecting and sampling dataRepresenting data numericallyRepresenting data diagramatically | **Critical analysis of given data**Using spreadsheets and tables to present logical and reasoned arguments in contextCommunicating mathematical approaches and solutionsAnalysing critically |
| **Estimation**The modelling cycleFermi estimation (the estimation of rough but quantitative answers to unexpected questions about the world) | **Normal distribution**Properties of the normal distributionUnderstanding and using statistical notationCalculating probabilities |
| **Personal finance** Numerical calculationsPercentagesInterest rates (savings and investments,)Repayments and the cost of credit (mortgages and loans, including student loans)Graphical representationTaxation (income tax, national insurance and VAT) Solving financial problems (inflation, retail price index, consumer price index; foreign currencies and commission; budgeting and bills) | **Correlation and regression**CorrelationThe product Moment Correlation Coefficient (PMCC)Regression linesCalculating predictions |
|  | **Probability and estimation**Population and samplesThe mean of a sample size nConfidence intervals |

**Summer preparation**

The purpose of giving you a summer bridging task is:

1. To provide a bridge from level 2 to level 3 study, and lead into the early stages of the course.
2. To engage you in independent learning which is required at level 3.
3. To encourage you to develop your work ethic and commitment to study.
4. To measure your suitability for the course and assess your initial levels of achievement.

The close relationship of the course to your prior learning in mathematics means that we do not expect a high level of preparation before starting the course. However, there are three short tasks outlined below.

**Task 1**: There are a number of key financial terms that you need to be familiar for the mathematical studies course.

It is important that you are aware what the meaning is of these terms. Note that many of these terms are defined in the glossary of the downloadable textbook ***Your money matters*** (see useful website below)

Define the following key terms:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Income tax | National insurance | Value added tax (VAT) | Inflation | Retail Price index (RPI) | Exchange rate |
| Simple interest | Compound interest | Annual Equivalent Rate (ERA) | Student loan | Mortgage | Annual Percentage Rate (APR) |

 **Task 2:** We will be learning how to carry out fermi estimation. Make notes on useful factors that might be needed to use estimation to answer ONE of the following questions:

|  |  |
| --- | --- |
| How much domestic water does the UK require each year? | A multi-billionaire offers to give you £5 billion but only if you count it out in £1 coins and arrange for them to be transported and stored at your home.Could you meet these conditions? |
| What is the average proportion of visiting time spent queuing for rides for a visitor to Alton Towers | How many times does a teenager say the word ‘like’ in one year |

**Task 3**: Consider the data represented below, published in The New York Times in Feb 2020, which represents the comparative response of different age groups of voters to four political issues in the US. What do you notice from these graphs? What do you wonder? Do you think a similar piece of research in the UK would generate similar conclusions?



**Please bring your work with you to your first lesson.**

**Potentially useful websites:**

Studying Maths beyond GCSE course choices:

<https://amsp.org.uk/students/gcse/what-next>

Download a PDF copy of the textbook ***Your money matters, Financial education textbook***

<https://www.young-enterprise.org.uk/resources/your-money-matters-financial-education-textbook/>

Explore the National Westminster Bank site My Money Sense

<https://natwest.mymoneysense.com/students/students-16-18/>

**Link to the AQA Core Maths, Level 3 Mathematical Studies Specification:**

<https://www.aqa.org.uk/subjects/mathematics/aqa-certificate/mathematical-studies-1350>